

Firearms, alcohol and crime: convictions for driving under the influence (DUI) and other alcohol-related crimes and risk for future criminal activity among authorised purchasers of handguns

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ABSTRACT

Firearm violence frequently involves alcohol, but there are no studies of misuse of alcohol and risk for future violence among firearm owners. We examined the association between prior convictions for alcohol-related crimes, chiefly driving under the influence (DUI), and risk of subsequent arrest among 4066 individuals who purchased handguns in California in 1977. During follow-up through 1991, 32.8% of those with prior alcohol-related convictions and 5.7% of those with no prior criminal history were arrested for a violent or firearm-related crime; 15.9% and 2.7%, respectively, were arrested for murder, rape, robbery or aggravated assault. Prior alcohol-related convictions were associated with a fourfold to fivefold increase in risk of incident arrest for a violent or firearm-related crime, a relative increase greater than that seen for age, sex or prior violence. Prior convictions for alcohol-related crime may be an important predictor of risk for future criminal activity among purchasers of firearms.

with convictions only for non-violent crimes had a fivefold or greater increase in risk for future violence, compared with purchasers with no prior criminal history. The category 'non-violent crimes' included DUI and other alcohol-related crimes.

A substantial research literature has established that DUI offenders have a high prevalence of excessive alcohol consumption and alcohol use disorders.^{11 12} Similarly, many studies have found that individuals with DUI convictions are more likely than others to engage in criminal activity of other types, including violent and weapon-related crimes.^{13–19} Those studies found that the magnitude of the increase is directly related to the number of DUI convictions, but others have not.²⁰ In this study, our primary hypothesis is that among persons who legally purchase handguns, those with prior convictions for DUI and other misdemeanour alcohol-related crimes will be at increased risk of subsequent arrest for a violent or firearm-related crime.

INTRODUCTION

Firearm violence is an important cause of death and injury worldwide. In the USA, there were 21 334 firearm suicides and 10 945 firearm homicides in 2014.¹ Firearm violence frequently involves alcohol; among men in the USA, alcohol-attributable deaths from firearm violence essentially equal those from MVCs.²

Cross-sectional and case-control studies have identified acute alcohol intoxication and a history of alcohol abuse as important risk factors for committing interpersonal and self-directed violence with firearms.^{2 3} Longitudinal studies in the general population have established pre-existing alcohol abuse as an independent risk factor for future violence, even when potential confounders are taken into account.^{4–9} There are no comparable studies specifically of firearm owners, though risk factors for violence are obviously of interest in a population with universal access to lethal weapons.

We report here the results of a longitudinal study of the association between prior convictions for alcohol-related crimes, chiefly driving under the influence (DUI), and risk for subsequent criminal activity among legal purchasers of handguns in California. This is a secondary analysis of data for a study, originally published in 1998, of prior criminal activity as a predictor of future violence among handgun purchasers.¹⁰ In that study, purchasers

METHODS

This was an observational study of a random sample of 5923 persons <50 years of age who purchased a handgun from a licensed retailer in California in 1977, stratified by the presence or absence of a criminal history at the time of purchase. Methods are discussed in detail elsewhere.¹⁰ The California Department of Justice provided criminal records that included arrests and convictions beginning at age 18. The study was powered to detect a RR of 1.5 ($p \leq 0.05$ and $1 - \beta = 0.8$) for an arrest following handgun purchase among purchasers having prior convictions for violent or firearm-related crimes, compared with purchasers having no prior criminal history.

The main outcome event was an incident arrest for a violent or firearm-related crime. The period of observation for detection of outcome events began on the first day the handgun could have been acquired (15 days after the purchase, given California's required waiting period at that time), and ended 31 December 1991. Only in-state arrests were captured because records from other states were not available. Subjects were considered at risk for outcome events for only as long as they could be determined, independently of outcome events, to be alive and residing in California. This was done by seeking records for subjects in state driver's licence records, credit agency data,

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property owner registries, telephone directories, city directories, and state and national mortality files.¹⁰

For this analysis, the study population was restricted to handgun purchasers with prior convictions for alcohol-related crimes and those with no prior criminal history; subjects with a criminal history but no alcohol-related convictions were excluded. Crimes were classified in mutually exclusive groups: alcohol related, violent or firearm related and other. Only crimes that involved illegal use of alcohol by the person charged (eg, DUI) were classified as alcohol related. Crimes where the association between the person charged and alcohol misuse was circumstantial (eg, possession of open container while driving, possession by a minor without intoxication), and liquor law violations (eg, selling alcohol to minors), were classified as other. Violent and firearm-related crimes were combined because aggravated assault was often recorded without information on the type of weapon involved, if any. Violent crimes involving alcohol (eg, DUI with bodily injury) were uncommon and were classified as violent.

Standard descriptive tabulations were created. The significance of differences between groups was estimated using the χ^2 statistic. Poisson regression with robust variance was used to estimate RRs and 95% CIs for subsequent arrest among subjects with prior convictions for alcohol-related crimes while controlling for the effects of demographics, other elements of the criminal history and duration of follow-up. This approach was chosen over the log-binomial model due to convergence issues that are typical in that type of regression.²¹ Risk of arrest was assessed for each of the crime categories already mentioned and for the aggregate of homicide, rape, robbery and aggravated assault—the violent crimes in the Federal Bureau of Investigation's Crime Index. Handgun purchasers with no prior criminal history served as the referent population.

Tests of significance were two-sided, with $p < 0.05$ indicating statistical significance. SAS software was used for all analyses (SAS for Windows, V9.3, SAS Institute, Cary, North Carolina, USA).

RESULTS

Of 4066 handgun purchasers in the study population, 1272 (31.3%) had prior convictions for alcohol-related crimes and 2794 (68.7%) had no prior criminal history. Subjects with convictions were more likely than others to be male and were older (table 1); approximately a third (35.4%) had multiple alcohol-related convictions (table 2). Altogether, the 1272 subjects had accrued 2144 alcohol-related convictions, of which 1668 (77.8%) were for DUI.

Follow-up was available for the entire period of observation for 2944 subjects (72.4%), for part of that period (median, 8.0 years) for 601 subjects (14.8%), and not at all for 521 subjects (12.8%). There were no statistically significant differences between subjects with and without follow-up on sex, age or prevalence of alcohol convictions (data not shown).

During follow-up, 597 (54.1%) of subjects with prior alcohol-related convictions and 239 (9.8%) of those with no prior criminal history were arrested (table 3, see online supplementary appendix tables 1–2). Nearly a third (32.8%) of those with prior convictions were arrested for a violent or firearm-related crime, and 15.9% were arrested for murder, rape, robbery or aggravated assault. For all crime types, the incidence of arrest was higher for subjects with prior alcohol-related convictions than for those with no criminal history, was higher for men than for women and was inversely related to age (table 3, see online supplementary appendix tables 1–2).

Table 1 Demographic characteristics at baseline for study subjects

Characteristic	Prior alcohol-related conviction n=1272 n (%)	No prior criminal history n=2794 n (%)	p Value
Sex			<0.0001
Male	1227 (96.5)	2373 (84.9)	
Female	45 (3.5)	421 (15.1)	
Age, years			<0.0001
≤24	179 (14.1)	630 (22.6)	
25–34	531 (41.8)	1185 (42.4)	
35–49	562 (44.2)	979 (35.0)	
Race/ethnicity			<0.0001
White	697 (54.8)	1968 (70.4)	
Black	156 (12.3)	194 (6.9)	
Hispanic	366 (28.8)	429 (15.4)	
Asian/other/unknown	53 (4.2)	203 (7.3)	

Table 2 Frequency of criminal convictions at baseline for 1272 study subjects with prior alcohol-related convictions

Nature of crime	Finding
Alcohol related	
2+ (n of subjects, %)	450 (35.4)
1	822 (64.6)
Median (IQR)	1 (1–2)
Range	1–22
Violent or firearm-related	
2+ (n of subjects, %)	83 (6.5)
1	191 (15.0)
0	998 (78.5)
Median (IQR)	1 (1–2)
Range	1–5
Other	
2+ (n of subjects, %)	397 (31.2)
1	315 (24.8)
0	560 (44.0)
Median (IQR)	2 (1–3)
Range	1–25

In multivariate analysis (table 4, see online supplementary appendix table 3), subjects with prior alcohol-related convictions were at substantially increased risk of arrest for all types of crime; RRs were approximately 4–5 generally and much higher for alcohol-related crimes. Risk was higher for men and inversely related to age, but these relative effects were smaller than those for prior alcohol-related convictions. Risk did not increase with the number of prior alcohol-related convictions. Prior convictions for violent or firearm-related crimes were generally not associated with risk of arrest and only weakly and inconsistently so for arrests involving new violent or firearm-related crimes.

In a subset analysis (see online supplementary appendix table 4), subjects with only one prior DUI conviction and no arrests or convictions for crimes of other types were at substantially increased risk of arrest for violent or firearm-related crimes generally (RR=4.2, 95% CI 3.1 to 5.6) and for

Table 3 Incidence of arrest among handgun purchasers* by baseline characteristics

Characteristic	Nature of crime	
	Any n (%)	Violent or firearm related n (%)
No prior criminal history (n=2441)	239 (9.8)	138 (5.7)
Sex		
Male (n=2077)	218 (10.5)	131 (6.3)
Female (n=364)	21 (5.8)	7 (1.9)
Age, years		
≤24 (n=521)	63 (11.8)	39 (7.3)
25–34 (n=1039)	123 (11.8)	69 (6.6)
35–49 (n=870)	53 (6.1)	30 (3.5)
Race/ethnicity		
White (n=1712)	135 (7.9)	81 (4.7)
Black (n=166)	39 (23.5)	23 (13.9)
Hispanic (n=385)	55 (14.3)	29 (7.5)
Asian/other/unknown (n=178)	10 (5.6)	5 (2.8)
Prior alcohol convictions (n=1104)	597 (54.1)	362 (32.8)
Sex		
Male (n=1069)	580 (54.3)	355 (33.2)
Female (n=35)	17 (48.6)	7 (20.0)
Age, years		
≤24 (n=158)	106 (67.1)	73 (46.2)
25–34 (n=452)	273 (60.4)	162 (35.8)
35–49 (n=494)	218 (44.1)	127 (25.7)
Race/ethnicity		
White (n=594)	298 (50.2)	173 (29.1)
Black (n=141)	94 (66.7)	62 (44.0)
Hispanic (n=324)	179 (55.3)	112 (34.6)
Asian/other/unknown (n=45)	26 (57.8)	15 (33.3)

*For subjects with independent verification of continued residence in California during follow-up.

murder, rape, robbery and aggravated assault (RR=3.8, 95% CI 2.1 to 6.7). Risk was not increased further among subjects with multiple DUI convictions. Very similar results were observed for the broader subset of subjects with only alcohol-related convictions and arrests (see online supplementary appendix table 5).

DISCUSSION

In this population of legal handgun purchasers, prior convictions for DUI and other alcohol-related crimes were associated with a large increase in risk of arrest for crimes of all types, including violent and firearm-related crimes. This RR increase was independent of and greater than those associated with other known risk factors for future violence: age, sex and prior violence.

The finding of an alcohol-associated increase in risk for violence among firearm owners is consistent with results of many prior studies in less specialised populations.^{2–9 19} The lack of association between the number of prior alcohol-related convictions and risk of arrest was unexpected, given the results from most prior studies.^{13–19} So too was the finding that, in subjects with prior convictions for alcohol-related crimes, convictions for other types of crimes were largely unrelated to risk of future arrest. These results will require confirmation.

The number of firearm purchasers with prior alcohol-related convictions may be substantial. Firearm owners are more likely than others to report excessive alcohol consumption;^{2 3 22} in any 30-day period as many as 11.7 million firearm owners binge drink, and 3.6 million drink heavily on a continuing basis.² Research now in progress will provide information on the prevalence of prior alcohol-related convictions among legal purchasers of firearms.²³

Given the association between alcohol misuse and violence in the general population, many states restrict access to firearms by

Table 4 RR* of incident arrest by baseline characteristics of study subjects

Characteristic	Nature of crime			Violent or firearm related		
	Any RR	95% CI	p Value	RR	95% CI	p Value
Sex			0.0001			<0.0001
Male	1.6	1.2 to 2.1		2.7	1.6 to 4.5	
Female	Referent			Referent		
Age, years			<0.0001			<0.0001
≤24	1.7	1.5 to 2.0		2.1	1.7 to 2.6	
25 to 34	1.5	1.4 to 1.7		1.6	1.3 to 1.9	
35 to 49	Referent			Referent		
Prior convictions			<0.0001			<0.0001
Alcohol related						
2 +	4.6	3.9 to 5.6		4.5	3.4 to 5.8	
1	4.5	3.9 to 5.3		4.0	3.2 to 5.1	
No prior criminal history	Referent			Referent		
Violent or firearm related			0.8			0.1
2 +	1.1	0.9 to 1.3		1.4	1.1 to 1.8	
1	1.0	0.9 to 1.2		1.0	0.8 to 1.3	
0+	Referent			Referent		
Other			0.02			0.003
2+	1.2	1.0 to 1.4		1.4	1.2 to 1.8	
1	1.2	1.0 to 1.3		1.3	1.1 to 1.6	
0+	Referent			Referent		

*Model adjusted for all variables in the table, race/ethnicity, 1/years from most recent prior arrest to date of purchase and years of follow-up.

†Includes subjects with no criminal history and subjects with no convictions of this type.

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persons who abuse alcohol; these statutes are vague enough to be largely unenforceable, however.²⁴ Three states and the District of Columbia have enforceable statutes based on convictions for alcohol-related crimes, but their effects are not known.² Analogous expansions of firearm purchase denial to person convicted of misdemeanour violent crimes, and to persons at high risk due to serious mental illness, have been effective violence prevention measures.^{25–27}

LIMITATIONS

A small percentage of DUI convictions among our study subjects may have resulted from impairment due primarily to drugs other than alcohol. From 1959 through 1977, when our study subjects purchased their handguns, California DUI law applied to individuals under the influence of 'intoxicating liquor, or under the combined influence of intoxicating liquor and any drug'.²⁸ (The law in effect from 1935 to 1959 was specific to impairment by 'intoxicating liquor'.²⁹ Comprehensive annual reports on blood alcohol concentrations (BACs) among California DUI arrestees, published since 1991, show that no more than 3% of arrestees had BACs of 0.00%–0.08% at the time of arrest.³⁰) Available data from earlier reports suggest that this percentage was if anything lower in earlier years.^{31–32}

This study has the obvious limitation that the data are old and from a single state. A large longitudinal study now under way will provide further information based on contemporary data.²³

What is already known on the subject?

- ▶ Firearm violence frequently involves alcohol.
- ▶ In the general population, pre-existing driving under the influence (DUI) and other alcohol-related criminal convictions are independent risk factors for future violence.

What this study adds

- ▶ In this study of future violence among firearm owners, prior DUI and other alcohol-related convictions were associated with a fourfold to fivefold increase in risk of arrest for a violent or firearm-related crime.
- ▶ This relative risk increase exceeded that seen for age, sex or prior violence.

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Contributors GJW made substantial contributions to study conception and design, acquisition of data, and analysis and interpretation of findings, drafted the manuscript and obtained funding for the study. MAW made substantial contributions to study conception and design, acquisition of data, and analysis and interpretation of findings and reviewed the draft manuscript critically for important intellectual content. AC-C and AS made substantial contributions to analysis and interpretation of findings and reviewed the draft manuscript critically for important intellectual content. MC made substantial contributions to study conception and design and analysis and interpretation of findings, and reviewed the draft manuscript critically for important intellectual content. All authors gave final approval of the version to be published.

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Provenance and peer review Not commissioned; externally peer reviewed.

Human subjects This secondary analysis of de-identified data was determined by the UC Davis Institutional Review Board not to be human subjects research (IRB ID 575358-1). The original study was approved by the UC Davis Human Subjects Review Committee.

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